

# PATENT SPECIFICATION

NO DRAWINGS

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## COMPLETE SPECIFICATION

### Low-Friction Plastics Materials

We, INSTITUT ELEMENTOORGANICHESKIKH SOEDINENY of ANSSR, U.S.S.R., Moscow, ulitsa, Vavilova, 14 or body corporate of the Union of Soviet socialist republics do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a low-friction plastics material suitable for use in making self-lubricating bearings and the like.

There are known antifriction materials prepared on the basis of cyclic polymers, for instance, polyimides, and fillers, such as graphite or molybdenum disulphide. A disadvantage of such antifriction materials is that, at high temperatures, their coefficient of friction is high and non-constant.

It is an object of the present invention to provide an antifriction material which has a low and constant coefficient of friction at temperatures.

The invention consists in an antifriction material comprising polybenzimidazole and molybdenum disulphide. Preferably, the antifriction material according to the invention comprises from 10% to 50%, by weight polybenzimidazole, based on the total weight of the material.

The invention also consists in a method of making shaped articles possessing a low coefficient of friction, by compacting a powdered mixture of polybenzimidazole and molybdenum disulphide at a temperature of 350 to 550°C and under a pressure of 800 to 1000 kg/cm<sup>2</sup>.

[Pri ]

In a modification of the method of the invention, used if the polybenzimidazole has no sharp melting point, shaped articles are made by compacting a powdered mixture of polybenzimidazole which contains not more than 30 per cent of polyaminoamide, resulting from incomplete ring-closure and molybdenum disulphide at a temperature of 450—550°C and under a pressure of 800—1000 kg/cm<sup>2</sup>.

The components of the antifriction material may also include metal powders, graphite or quartz powder.

The invention is illustrated by the following Examples.

#### EXAMPLE 1

300 grams of polybenzimidazole prepared from tetraaminodiphenylmethane and diphenyloxidedicarboxylic acid, and 2700 grams of powdered molybdenum disulphide with a particles size from 1 to 15 microns, are loaded into a vibrating mixer and agitated therein for 1½ minutes.

The mix thus obtained is compacted at a temperature of 360°C and under a pressure of 800—1000 kg/cm<sup>2</sup>.

#### EXAMPLE 2

300 grams of polybenzimidazole prepared from diaminotolylene and isophthalic acid, 750 grams of copper powder and 1950 grams of powdered molybdenum disulphide with a particle size from 1 to 15 microns, are loaded into a vibrating mixer and agitated therein for 1½ minutes.

The mix thus obtained is compacted at a temperature of 370°C and under a pressure of 800—1000 kg/cm<sup>2</sup>.

## EXAMPLE 3

300 grams of polybenzimidazole prepared from tetraaminodiphenylmethane and diphenyloxidedicarboxylic acid, 750 grams of silver powder, 150 grams of quartz powder and 1800 grams of powdered molybdenum disulphide with a particle size from 1 to 15 microns, are loaded into a vibrating mixer, and the mixture was thereafter treated according to Example 1.

## EXAMPLE 4

60 grams of polybenzimidazole prepared from diaminobenzidine and isophthalic acid and containing 25 per cent of non-ring-closed polyaminoamide, 40 grams of silver powder, 60 grams of powdered molybdenum disulphide with a particle size from 1 to 15 microns, and 40 grams of graphite are loaded into a vibrating mixer and agitated for 6 minutes. The mix thus obtained is compacted at a temperature of 500—510°C and under a pressure of 1000 kg/cm<sup>2</sup>.

The antifriction materials obtained according to Examples 1—4 possesses a constant, small coefficient of friction at high temperatures and have the following properties:

Brinell hardness number	25—30
compressive strength	800—1200 kg/cm <sup>2</sup>
coefficient of friction	0.08—0.1

## WHAT WE CLAIM IS:—

1. An antifriction material comprising polybenzimidazole and molybdenum disulphide.

2. A material according to claim 1, containing from 10% to 50% by weight of polybenzimidazole, based on the total weight of the material.

3. A material according to claim 1 or claim 2, which also comprises a powdered metal, graphite or quartz powder.

4. A method of making shaped articles possessing a low coefficient of friction, by compacting a powdered mixture of polybenzimidazole and molybdenum disulphide at a temperature of 350 to 550°C and under a pressure of 800 to 1,000 kg/cm<sup>2</sup>.

5. A method according to claim 4, in which said polybenzimidazole contains not more than 30% of polyaminoamide resulting from incomplete ring-closure, and in which the temperature used is from 450 to 550°C.

6. A method according to claim 4, substantially as herein described in any of the Examples.

7. Shaped articles when made by the method of any of claims 4 to 6.

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